

13

eluted from the solution for amplification and/or analysis. The photodegradable polymer of the photodegradable sample collection device may enable increased recovery of trace biological samples and a decrease in degradation of the biological sample in the process of capture and release. Further, the photodegradable sample collection device may be in a variety of forms, such as swabs, pads, brushes, or paper, thus enabling biological sample collection in a variety of formats. Additionally, the disclosed embodiments may include a photodegradable sample collection kit that may include any or all of the materials (e.g., photodegradable sample collection system) for capture and release of trace biological samples using the photodegradable sample collection device.

This written description uses examples to disclose the concepts discussed herein, including the best mode, and also sufficient disclosure to enable any person skilled in the art to practice the disclosure, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the disclosure is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal language of the claims.

The invention claimed is:

1. A method, comprising:

providing a biological sample;

providing a sample collection device, wherein the sample collection device comprises a sample binding surface comprising a photodegradable polymer configured to bind the biological sample, wherein the sample binding surface or a coating of the sample collection device comprises fibers comprising the photodegradable polymer wherein the fibers are between 1 nanometer and 20 micrometers in thickness;

14

contacting the biological sample with the sample binding surface of the sample collection device;

irradiating the sample binding surface and the bound biological sample using light emitted from a light source to initiate degradation of the photodegradable polymer of the sample binding surface to cause release of the biological sample, wherein the light comprises light of a wavelength between 300 nanometers and 700 nanometers.

2. The method of claim 1, wherein the photodegradable polymer comprises one or more hydrophobic polymers.

3. The method of claim 1, wherein the photodegradable polymer is water insoluble in polymer form.

4. The method of claim 1, wherein the degradation of the photodegradable polymer comprises cleaving one or more photocleavable moieties of the photodegradable polymer to break the photodegradable polymer into a plurality of polymers, monomers, oligomers, or a combination thereof, wherein the plurality of polymers, monomers, oligomers, or a combination thereof is water soluble.

5. The method of claim 4, further comprising:

contacting the sample binding surface and the bound biological sample with a solution before initiating the degradation, wherein the plurality of polymers, monomers, oligomers, or a combination thereof are released into the solution; and

isolating the biological sample from the solution.

6. The method of claim 1, wherein the sample binding surface or a coating of the sample collection device comprises fibers comprising the photodegradable polymer, wherein the fibers are created by electrospinning.

7. The method of claim 1, wherein the light is of a wavelength between 350 nm and 380 nm.

8. The method of claim 1, wherein the sample collection device comprises one of a swab, a pad, a brush, or a piece of paper.

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